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EXPLORATION NUMBER

THE AMERICAN MUSEUM JOURNAL



EXPLORING PARTY IN VIEW OF MOUNT RORAIMA.

Volume XI

December, 1911

Number 8

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The American Museum Journal

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MARY CYNTHIA DICKERSON, *Editor*

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KAIETEUR, THE GREAT FALLS OF THE GUYANAS

No photograph or verbal description can set forth the magnificence of Kaieteur Falls and the wonderful beauty of their setting. Nearly four hundred feet wide and seven hundred and forty feet high — more than four times as high as Niagara — the white waters roll down from the hard rock on the brim to rush in a cataract through the great gorge

— "Through British Guiana and Brazil to Mount Roraima," page 33

The American Museum Journal

VOL. XI

DECEMBER, 1911

No. 8

A REVIEW OF THE MUSEUM'S EXPLORATION WORK

EXPLORATION has been a steadily growing factor in the development of the American Museum since 1887. It was in this year that Daniel Giraud Elliot accompanied by the taxidermist Jenness Richardson was sent into Montana to secure wild specimens of bison. The splendid Buffalo Group in the American Mammal Hall is the result of this expedition. In 1888 the newly appointed Assistant Curator of Birds, Frank M. Chapman, went to Florida on the first of his almost annual journeys. With the advent of Henry Fairfield Osborn, Curator of Vertebrate Palaeontology in 1891 and of Frederic W. Putnam, Curator of Anthropology in 1894, explorations began in every department and have become an important branch of the Museum's work, until in the year 1911 there are no fewer than fifty localities being worked by parties in the field. In the twenty years from 1891 to 1911, the number of distinct exploring parties led by from one to four or five men, with a geographic range of work extending over North and South America, the South Pacific Islands, the West Indies and the East Indies, Eastern Asia and Northern and Central Africa, have been numerically distributed as follows:

Extinct and living races of men	163
Extinct mammals, reptiles, amphibians and fishes	65
Existing mammals, birds, reptiles and fishes	48
Geology of North America	10

In the early years of its history the Museum depended solely upon purchases from dealers and collectors; in recent years, except in the matter of minerals, its collections have been enriched far more by exploration than by purchase. Richer even than the collections is the scientific spirit which exploration has brought into the life of the Museum, the energy, devotion and self-sacrifice, the many contributions to the sum of human knowledge in geography, geology, ethnology, palaeontology, and all branches of zoölogy. These place the Museum among the foremost scientific institutions in the country.

The exploration spirit has fostered the modern development of showing the environment with the specimen, of exhibiting a living picture of a mammal or a bird, just as it was William T. Hornaday's travels in the jungles of Borneo which led him to install in the National Museum of Washington in 1883 the first habitat group, showing orang-utans in their native forest. Now not only the naturalist but also the taxidermist, the photographer and the artist make up the well-equipped zoölogical expedition, and each contributes his quota to the *mise en scène* of a finished group.

EXPLORING AND FIELD PARTIES OF 1911

The following fifty-one localities represent points at which exploration or field study and collecting have been in progress during the past year. Of this number forty-four stand for the work of definite exploring or collecting parties sent out by the Museum and acting under the direction of members of the Scientific Staff, while the remaining seven places represent the work of collectors, who are agents of the Museum in that they are authorized to gather together collections for purchase by the institution. All exploration work of the Museum must be carried on with Museum funds and is not in any way supported by the City.

VERTEBRATE PALEONTOLOGY

1. Red Deer River, Alberta. Cretaceous and Lower Eocene Deposits. Barnum Brown.
2. Wyoming Eocene deposits. Walter Granger.
3. Miocene deposits near head of Niobrara River. Albert Thomson.
4. Pleistocene fossils at various points in Texas. Barnum Brown.
5. 6 and 7. Eocene fossils in Louisiana, Mississippi and Alabama. Barnum Brown.
- 8 and 9. Districts in Florida examined for fossil mammals by Barnum Brown.
- 10, 11, 14, and 15. Pleistocene fossils at points in Mexico. Barnum Brown.
- 12 and 13. Cuba near Caribarion in the north and Cienfuegos in the south. Barnum Brown.

MAMMALOGY AND ORNITHOLOGY

1. Arctic Expedition in the field since 1908. Zoological Survey. R. M. Anderson.
2. Lower California Albatross Expedition for fishery, oceanographic and biological investigations. Charles H. Townsend.
- 3 and 4. Western Venezuela and northeastern Colombia. M. A. Carriker, Jr., agent.
5. Panama. W. B. Richardson, Collector.
6. Cauca region, western Colombia. Biological survey. Frank M. Chapman.
7. Turkestan. Local collector, agent of the Museum.
8. Japan and Korea. Study and Collection of whales. Roy C. Andrews.
9. Weihsiien, Shantung, northern China. Paul D. Bergen, agent of the Museum.
10. British East Africa. Special study for habitat group of elephants. Carl E. Akeley.
- 11.* Congo Region. In the field since 1909. Zoological survey with reference first to mammals and birds and second to ethnological study, to invertebrates, fishes and reptiles. Herbert Lang and James Chapin.

INVERTEBRATE ZOOLOGY

1. Nahant, Mass. Tide-pool fauna. R. W. Miner.
2. Black Mountains, N. C. Insects. Hoffman Expedition, William Beutenmüller.
3. Florida. Exploration and collecting. F. E. Lutz and C. W. Leng.
4. Jamaica. Insects: problems of distribution. J. A. Grossbeck.
5. Dominica. Problems of evolution. H. E. Crampton, R. W. Miner and F. E. Lutz.
6. Biological survey, British Guiana. H. E. Crampton and F. E. Lutz; Brazil to Mt. Roraima, H. E. Crampton.

ANTHROPOLOGY

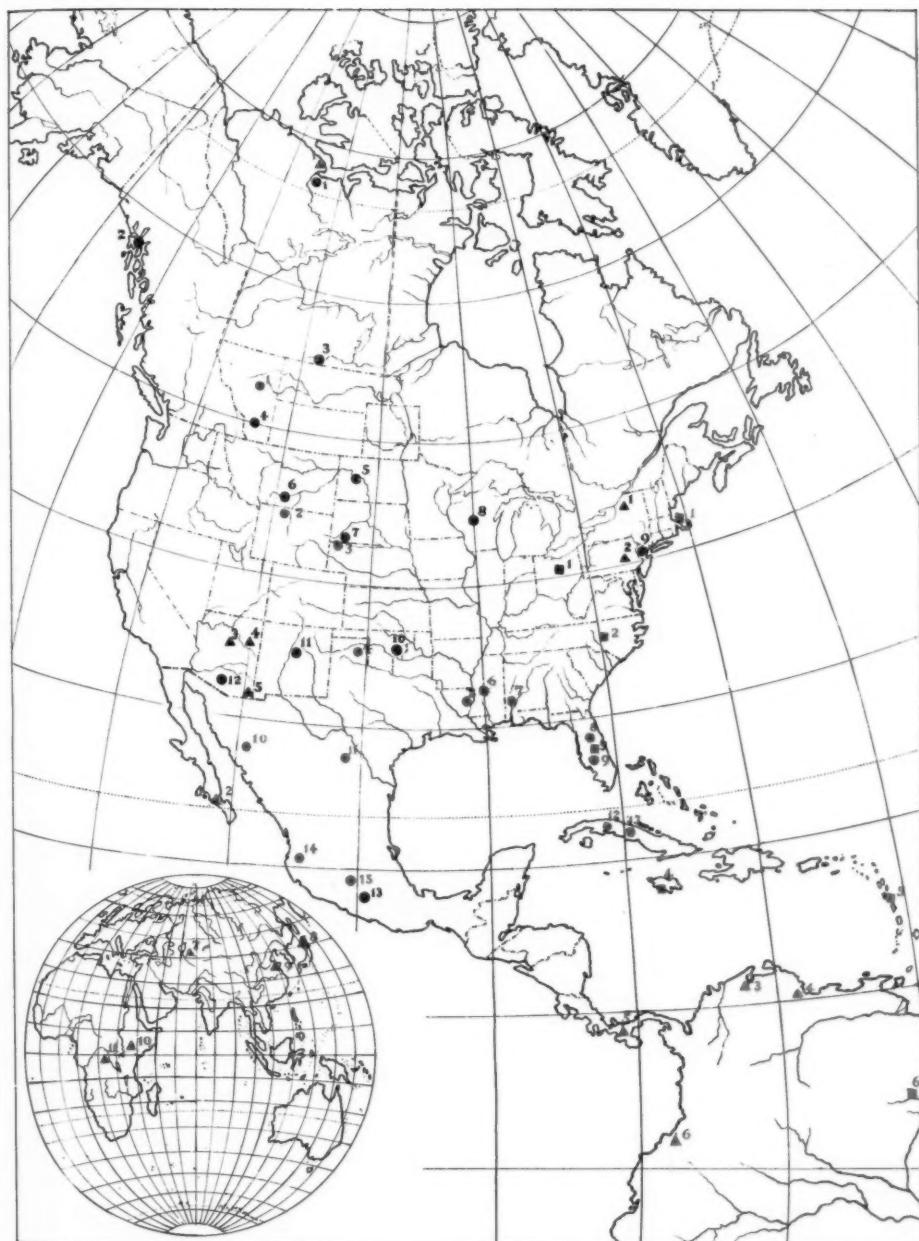
1. Arctic Expedition. Eskimos, especially of unexplored Coppermine Region. V. Stefánsson.
2. Sitka and Alaskan Coast. Tlingit Indians. W. S. Taylor and Lieut. G. T. Emmons.
3. Saskatchewan, Chipewyan Reservation. Phonetic and ethnological. P. E. Goddard.
4. Alberta, Sarsi Reservation. Linguistic and ethnological study. P. E. Goddard.
5. North Dakota, Ft. Berthold Reservation. Material culture. G. L. Wilson, agent.
6. Montana, Crow Reservation. Societies and ritualistic ceremonies. R. H. Lowie.
7. South Dakota, Pine Ridge Reservation. Clark Wissler and J. R. Walker, agent.
8. Wisconsin, Menomini Reservation. Societies, medicine bundles. Alanson Skinner.
9. Paterson, N. J. Rock shelters of prehistoric man. Max Schrabisch, Museum agent.
10. Oklahoma, Kiowa Apache Reservation. Linguistic study. P. E. Goddard.
11. Santa Fé, N. M. Material culture and art, Rio Grande Pueblo Indians. H. J. Spinden.
12. Tucson, Ariz. Textile arts of Papago and Pima Indians. M. L. Kissell.
13. Mexico City. Reconnaissance in archaeology. H. J. Spinden.

GEOLOGY AND INVERTEBRATE PALEONTOLOGY

1. Russell, N. Y. Field work for glacial pot hole.
2. Lancaster, Penn. Field collection of Cambrian trilobites.
- 3 and 4. Arizona. Field study of meteor crater and petrified forests. E. O. Hovey.
5. Bisbee, Ariz. Queen Copper mine for mine model and cave. E. O. Hovey.

ICHTHYOLOGY AND HERPETOLOGY

1. Districts in Ohio. Collections of Devonian fossil fishes. L. Hussakoff.



Location of Exploring and Field Parties of 1911

- Vertebrate Palaeontology
- Anthropology
- ▲ Mammalogy and Ornithology
- ▲ Geology and Invertebrate Palaeontology
- Invertebrate Zoology
- Ichthyology and Herpetology

If from these localities lines were drawn to New York, they would present graphically the influx of new material and ideas for the Museum's research and exhibition. In many cases the marks indicate but a small fraction of the area actually explored



Three members of the Department of Invertebrate Zoölogy fording a stream in Dominica

FAST VANISHING RECORDS

By Frederic A. Lucas

THE many expeditions sent out under the auspices of the Museum represent a most important branch of its work; they not only seek the records of the past, but also endeavor to secure for posterity the records of the present, which are in even greater danger of being lost.

Not only is man changing the entire face of nature, mowing down its forests and sweeping out of existence their inhabitants, but he is also blotting out with the sponge of civilization the everyday customs of the most secluded and isolated races of mankind. It is not so long ago that Sir John Franklin and his crew disappeared amid the Arctic ice and all traces of his ill-fated expedition were sought in vain for years; it is only yesterday that Livingstone was "lost" in Central Africa and Stanley dispatched to seek him. To-day an enterprising firm puts up a special brand of baking powder for the western Eskimo; Stefánsson deems it worthy of note that after three years' search he has found natives who have never seen a white man; and excursion trains are run to the falls of the Zambesi.

The public looks upon the mastodon as a rare animal, but more than a dozen skeletons are preserved in our museums and others are continually coming to light, while there is not in all the United States the skeleton of an adult wild African elephant. And Mr. Carl E. Akeley tells us that in a very few years not a single really old elephant will be left in the length and breadth of Africa, so keen is the hunt for ivory. Mr. A. Radelyffe Dugmore shows a photograph of a herd of hippos and tells us that since the picture was taken the herd has been exterminated.

A short time ago we read with pained interest articles on animals that have recently become extinct — soon it will be simpler to write of the animals that are left. Of course much of the extermination is, from man's standpoint, unavoidable. Man and wild beasts cannot live together in harmony, be he never so willing. We are all familiar with Kipling's graphic picture of "Letting in the Jungle," and in Africa, Mr. Akeley says that this is no fancy sketch, for a few elephants in a single night will undo the patient labor of years, trampling down crops and uprooting trees over many acres of cultivated land.

There are in existence boats in which hardy Norsemen may have cruised along the coast of New England before Columbus was born; we have queer craft that floated on the Nile in the time of Pharaoh, and canoes in which the early Britons paddled down the Thames when the hyena howled on the bank and the cave bear crashed through the underbrush. We possess not a fragment of the strange Beothuk canoes seen by Cabot and Cartier and scarcely more than a splinter even of one of the canoes that hovered about the "Half Moon" on her voyage up the Hudson little more than three hundred years ago. We know far more about the beliefs, the customs, the dress of the early Egyptians than we do of those of the Indians of Manhattan and Massachusetts.

The savage takes little interest in posterity, his immediate concern is with the present — to solve as easily as possible the problems of daily life. The ever present tin can costs no labor save that of picking it up, so it supersedes the basket; birch trees have become scarce and the picturesque birch bark canoe gives way to one covered with cotton cloth. So it is the world over:

"The old order changeth
Yielding place to new"—

and if within a very few years we do not secure the vanishing wild animals and not merely the fast disappearing utensils but also a record of the habits and beliefs of wild — or once wild — races, they will be lost to us and to the world forever.



A part of the Museum's Arctic Expedition pursuing its way over the snow and ice of the Coppermine River



THE BIG SLIDE TWENTY MILES BELOW RED DEER
A view on the Red Deer River where skulls and mammal jaws were collected from Eocene deposits. The river follows majestic curves and where its banks have no skeleton of rocks to hold them firm, it eats into the high walls of clay, which plunge down from time to time nearly choking the channel.



Flatboat constructed for drifting down Red Deer River. A twenty-two-foot sweep at each end, like a long oar, served in guiding the boat out of the way of rocks in the course. This was eventually converted into a houseboat because of excessive rains and dearth of camping places along the shores

FOSSIL HUNTING BY BOAT IN CANADA

By Barnum Brown

Photographs by the Author

“HOW do you know where to look for fossils?” is a common question. In general it may be answered that the surface of North America has been pretty well explored by government surveys and scientific expeditions and the geologic age of the larger areas determined. Most important in determining the geologic sequence of the earth's strata are the fossil remains of animal and plant life. A grouping of distinct species of fossils correlated with stratigraphic characters in the rocks determines these subdivisions. When a collection of fossils is desired to represent a certain period, exploring parties are sent to these known areas. Sometimes however, chance information leads up to most important discoveries, such as resulted from the work of the past two seasons in Alberta, Canada.

A visitor to the Museum, Mr. J. L. Wagner, while examining our mineral collections saw the large bones in the Reptile Hall and remarked to the Curator of Mineralogy that he had seen many similar bones near his ranch in the Red Deer Cañon of Alberta. After talking some time an invitation was extended to the writer to visit his home and prospect the cañon. Accordingly in the fall of 1909 a preliminary trip was made to the locality.

From Didsbury, a little town north of Calgary, the writer drove eastward ninety miles to the Red Deer River through a portion of the newly opened grain belt of Alberta, destined in the near future to produce a large part

of the world's bread. Near the railroad the land is mostly under cultivation and comfortable homes and bountiful grain fields testify to the rich nature of the soil. A few miles eastward the brushland gives way to a level expanse of grass-covered prairie dotted here and there by large and small lakes probably of glacial origin. Mile after mile the road follows section lines and one is rarely out of sight of the house of some "homesteader." It is through this level farm land that the Red Deer River wends its way flowing through a cañon far below the surface. Near Wagner's ranch the cañon was prospected and so many bones found that it appeared most desirable to do extended searching along the river.

Usually fossils are found in "bad lands," where extensive areas are denuded of grass and the surface eroded into hills and ravines. A camp is located near some spring or stream and collectors ride or walk over miles of these exposures in each direction till the region is thoroughly explored. Quite different are conditions on the Red Deer River. Cutting through the prairie land the river has formed a cañon two to five hundred feet deep and rarely more than a mile wide at the top. In places the walls are nearly perpendicular and the river winds in its narrow valley, touching one side then crossing to the other so that it is impossible to follow up or down its course any great distance even on horseback.

It was evident that the most feasible way to work these banks was from a boat; consequently in the summer of 1910 our party proceeded to the town of Red Deer, where the Calgary-Edmonton railroad crosses the river. There a flatboat, twelve by thirty feet in dimension, was constructed on lines similar to a western ferry boat, having a carrying capacity of eight tons with a twenty-two foot oar at each end to direct its course. The rapid current averaging about four miles per hour precluded any thought of going up stream in a large boat, so it was constructed on lines sufficiently generous to form a living boat as well as to carry the season's collection of fossils.

Supplied with a season's provisions, lumber for boxes, and plaster for encasing bones, we began our fossil cruise down a cañon which once echoed songs of the *Bois brûlé*, for this was at one time the fur territory of the great Hudson Bay Company.

No more interesting or instructive journey has ever been taken by the writer. High up on the plateau, buildings and haystacks proclaim a well-settled country, but habitations are rarely seen from the river and for miles we floated through picturesque solitude unbroken save by the roar of the rapids.

Especially characteristic of this cañon are the slides where the current setting against the bank has undermined it until a mountain of earth slips into the river, in some cases almost choking its course. A continual sortin-

We traveled for two hundred and fifty miles through such cañons. Judging from the wildness of the view, we were thousands of miles away from any habitation of man, yet now and then could gain a glimpse of haystacks on the level plateaus above. The expedition's camp and boat are seen on the bank in the foreground.

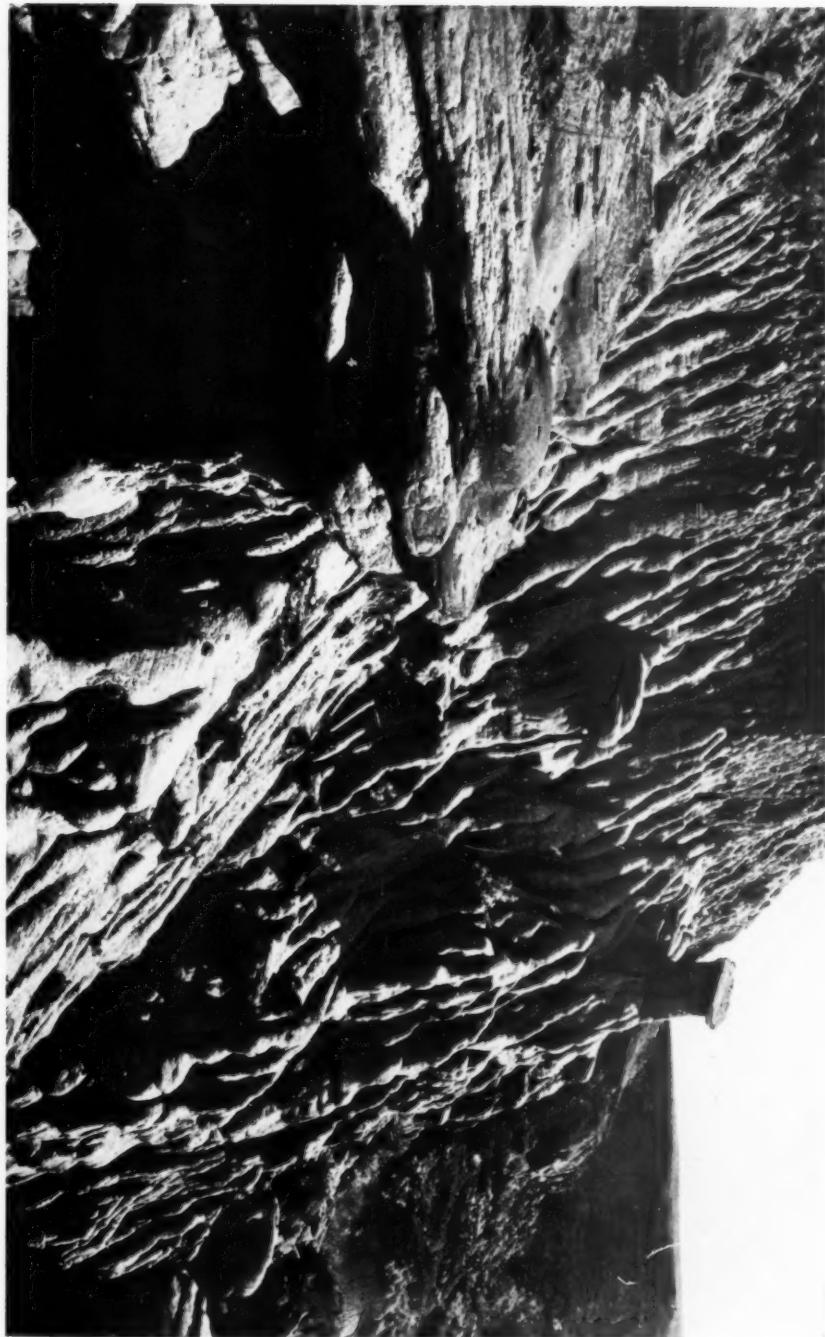


View on top of the plateaus along the Red Deer River. This Mecca of the farmer shows bountiful grain fields, where once flourished nothing but brush. This given out field produced eighty bushels to the acre.



CLAY BUTTES ALONG THE RIVER

partly brought to view by the action of the water



A FOSSIL IN POSITION (JUST ABOVE THE PICK)

At this spot three hundred feet above the river, an *Ankylosaurus* skeleton was found. The skull lies at the head of the pick, the tail and other parts of the skeleton had washed out and down and were partly covered twenty feet below. To obtain the skeleton the side of the hill was blasted off through an area thirty feet long and twenty-five feet high.

thus goes on, the finer material being carried away while the boulders are left as barriers forming slow moving reaches of calm water and stretches of rapids difficult to navigate during low water. In one of these slides we found several small mammal jaws and teeth not known before from Canada, associated with fossil clam shells of Eocene age.

The long midsummer days in latitude 52° gave many working hours, but with frequent stops to prospect the banks we rarely floated more than twenty miles per day. An occasional flock of ducks and geese were disturbed as our boat approached and bank beaver houses were frequently passed, but few of the animals were seen during the daytime. Tying the boat to a tree at night we would go ashore to camp among the trees where after dinner pipes were smoked in the glow of a great camp fire. Only a fossil hunter or a desert traveler can fully appreciate the luxury of abundant wood and running water. In the stillness of the night the underworld was alive and many little feet rustled the leaves where daylight disclosed no sound. Then the beaver and muskrat swam up to investigate this new intruder, while from the tree-tops came the constant query, "Who! Who!"

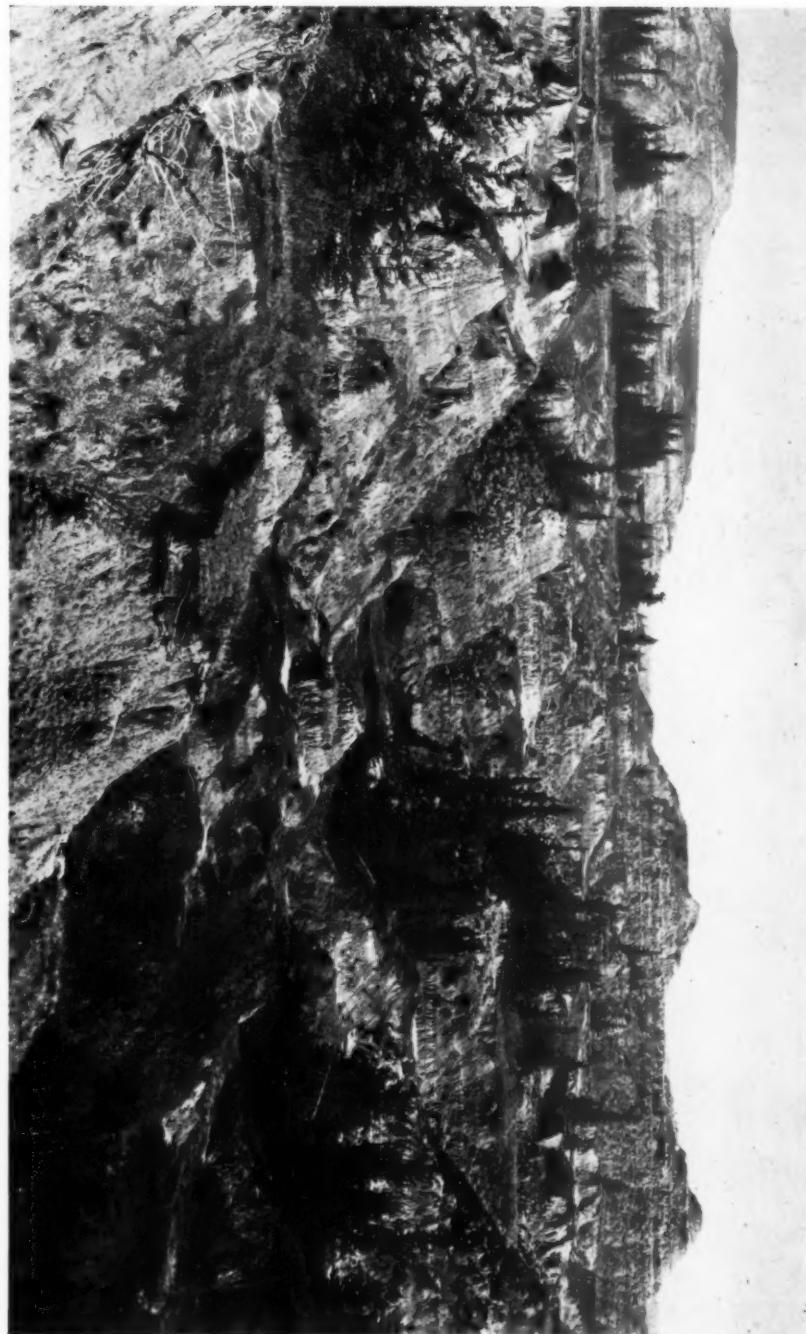
For seventy miles the country is thickly wooded with pine and poplar, the stately spruce trees silhouetted against the sky adding a charm to the ever changing scene. Nature has also been kind to the treeless regions beyond, for underneath the fertile prairie, veins of good lignite coal of varying thickness are successively cut by the river. In many places these are worked in the river banks during winter. One vein of excellent quality is eighteen feet thick, although usually they are much thinner. The government right has been taken to mine most of this coal outcropping along the river.

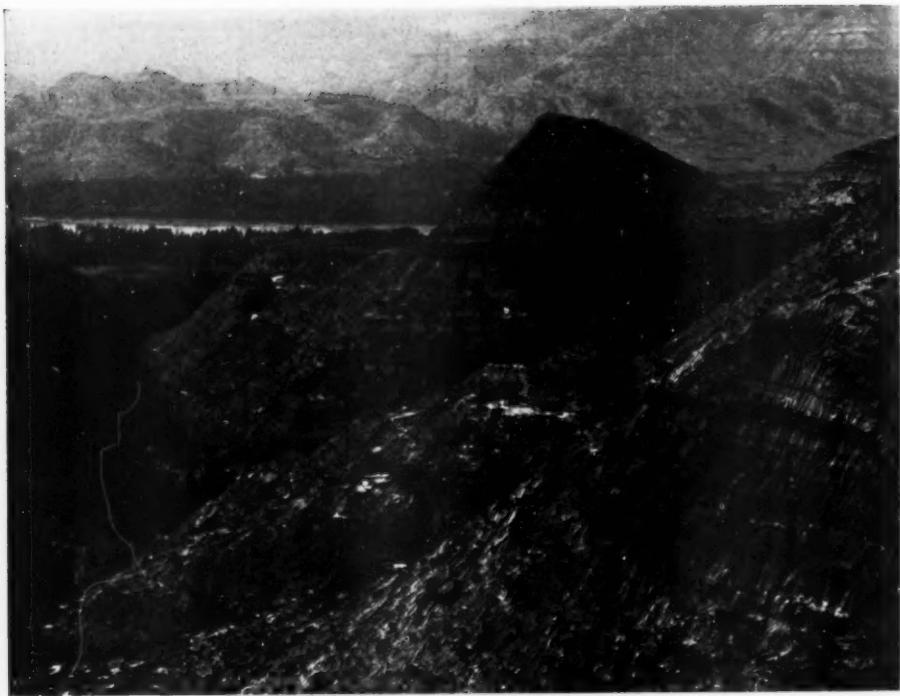
Along the upper portion of the stream are banks of Eocene age, from which shells and mammal jaws were secured, but near the town of Content where the river bends southward, a new series of rocks appeared and in these our search was rewarded by finding dinosaur bones similar to those seen at Wagner's ranch. Specimens were found in increasing numbers as we continued our journey, and progress down the river was necessarily much slower. Frequently the boat would be tied up a week or more at one camp while we searched the banks, examining the cliffs layer by layer that no fossil might escape observation. With the little dingey the opposite side of the river was reached so that both sides were covered at the same time from one camp. As soon as a mile or more had been prospected or a new specimen secured, the boat was dropped down to a new convenient anchorage. Box after box was added to the collection till scarcely a cubit's space remained unoccupied on board our fossil ark.

Where prairie bad lands are eroded in innumerable buttes and ravines

ONE OF THE MOST PICTURESQUE SECTIONS ALONG RED DEER RIVER

Black-tailed deer were frequently seen in such regions. This is the site of the crossing of the Alberta Central Railroad bridge, which is to be one mile in length and four hundred and seventy feet above the water.





A view across the cañon from the left bank of the river. Taken from an elevation of five hundred feet



Fossil ripples in sandstone. In the Cretaceous period of the past these were ripples in sand along the shores of some prehistoric lagoon, where grew figs and other warm temperate vegetation contrasting with the present vegetation and the ice and snow of Alberta



At this point some distance up from the river, an eight-hundred-pound specimen was excavated
A sled was constructed on which to drag it down to the river



At the river the specimen was floated in a little dingey down to the big boat



it is always doubtful if one has seen all exposures, so there was peculiar satisfaction in making a thorough search of these river banks knowing that few if any fossils had escaped observation. On account of the heavy rainfall and frequent sliding of banks new fossils are exposed every season so that in a few years these same banks can again be explored profitably. This river will become as classic hunting ground for reptile remains as the Bad Lands of South Dakota are for mammals.

Although the summer days are long in this latitude the season is short and thousands of geese flying southward foretell the early winter. Where the temperature is not infrequently forty to sixty degrees below zero in winter, it is difficult to think of a time when a warm climate could have prevailed, yet such condition is indicated by the fossil plants.

When the weather became too cold to work with plaster, the fossils were shipped from a branch railroad forty-five miles distant, the camp material was stored for the winter and with block and tackle the big boat was hauled up on shore above the reach of high water.

In the summer of 1911 the boat was recalked and again launched when we continued our search from the point at which work closed the previous year. During the summer we were visited by the Museum's President, Prof. Henry Fairfield Osborn, and one of the Trustees, Mr. Madison Grant. A canoeing trip, one of great interest and pleasure, was taken with our visitors covering two hundred and fifty miles down the river from the town of Red Deer, during which valuable material was added to the collection and important geological data secured.

As a result of the Canadian work the Museum is enriched by a magnificent collection of Cretaceous fossils some of which are new to science.



The gorge of the Potaro River below Kaieteur Falls

BRITISH GUIANA AND BRAZIL TO MOUNT RORAIMA

By Henry E. Crampton

Photographs by the Author

DURING the past summer I had the good fortune to make a journey from Georgetown on the coast of British Guiana to the great mountain of Roraima — the famous tableland that stands at the junction of Brazil, Venezuela and British Guiana. In its course the way led along the rivers of the lower country to Kaieteur, the magnificent waterfall of the Potaro River, then continued through the higher forests of Guiana across the border and out on the savannahs of northern Brazil.

The main object was to run a biological traverse from the coast to the high levels centering about Mount Roraima. To the biologist, the fauna and flora of this portion of South America are particularly interesting in connection with the larger problems of geographical distribution and evolution, for reasons which may be briefly stated as follows. During the glacial period, great ice sheets came well down into the United States and destroyed many or most of the species living there. Later the climatic conditions changed to those of the present temperate situation; as such changes gradually came about, North America was repopulated by organisms which set out from South America, and mainly from two centers of dispersal. The first of these was the northern Andean region, from which most of the emigrants reached the United States by way of the Isthmus of



ON THE POTATO RIVER NEAR KAIETEUR
Leaving Kaieteur camp for the further journey toward Mount Roraima. The two smallest boys remained to assist Dr. Lutz; the others proved
splendidly efficient carriers throughout the expedition's travels

Panama, Central America and Mexico. The other center was the high interior region of which Roraima is the present focus, from which migration was mainly by way of the West Indies and Florida.

With these fundamental facts at hand, the Department of Invertebrate Zoölogy of the American Museum reached a point in the development of its scientific work where it seemed desirable to undertake an extensive series of explorations in the Antilles and northern South America, in correlation with field studies in characteristic localities of North America, in order to trace as clearly as possible the lines of migration and distribution in past geological times, and to gain fuller knowledge of the evolutionary history of lower organic forms. In pursuance of these purposes, an attack upon the Roraima center of dispersal was determined upon for an initial survey.

After a short period of field work in Dominica and other islands, Dr. Lutz and I continued on to Demerara, and on July first we sighted the low coast of the continent where the many chimneys from the sugar mills rose like so many lighthouses. With the aid of new-found friends in the colony, final preparations were hastened for the start into the interior, which was made by steamer up the Demerara River. The scenery along the river prevented the time from passing tediously, soon our equipment was transferred to the awaiting train, and we went on to the Essequebo River. Owing to the heavy rains of the preceding weeks this river was well up under the hostelry where we stopped, so that the house servants angled from the very windows with almost ludicrous success. The howling of the monkeys, new to our ears, roused us early on the following morning, and for a day we remained here, occupying the time profitably in collecting on the sandy lowlands and rises back from the river, where the drogher ants ply their ceaseless course from the leafy boughs to underground chambers. On July 10, we proceeded to Tumatumari and here, as well as farther on up the rivers, we found ourselves the first occupants of the rest-houses built for the use of travelers to Kaieteur. The journey to Potaro Landing, and the walk across country to Kangaruma were accomplished without incident. At the latter place, three Patamona Ackawoi Indians were secured and, the journey resumed, we arrived at Tukeit on the evening of July 15, one week from Georgetown. It was almost a physical relief to reach the foothills of the higher ground after the continuous lowlands. Doubly enjoyable was the first glimpse of Kaieteur, which we saw from a point far down the gorge, above waters so still that not only were the mountains reflected in all their beauty of form and color, but even Kaieteur itself was mirrored there.

The next task was to accomplish the transport of our goods to the Kaieteur Plateau from Tukeit, the head of river navigation. Two of our



Indian file across the savannahs



Looking over the dense canopy of the forest toward the cloud-filled valley of the Ireng I ver
and to the Brazilian border beyond
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own Indians were sent for bearers to the settlement on the Chenapowu about "Holmia," the home of the late Dr. Bovallius, thirty miles beyond the rim of the great falls. On July 19, Sprostons' men carried up enough equipment to establish a camp and field-base on the Potaro River, about a mile above the falls, where I took up my work.

No photograph or verbal description can set forth the magnificence of Kaieteur Falls and the wonderful beauty of their setting. Nearly four hundred feet wide and seven hundred and forty feet high, the white waters roll down from the hard rock on the brim to rush in a cataract through the great gorge, nearly a thousand feet below the level of the plateau. It was a delight to explore the forests and savannahs of this plateau, and to gain with every day new views of the beauty of this natural marvel.

Our Indian messengers returned on the twenty-first with a party of eleven Chenapowu natives and better still, with a "ballyhoo" (or punt) which was very old but none the less serviceable. Shy and reticent at first, the Indians soon responded to advances and by the twenty-eighth, when all the goods were brought up, cordial relations had been established. Dr. Lutz, who had remained below to study the Tukeit region in detail, came up with the last carriers to occupy the camp and to make a close comparative study of the savannahs and forests of the Kaieteur Plateau, while I pushed on to Brazil in the hope of reaching Roraima. It is true the attempt seemed foolhardy in view of the short time available and the arduous nature of the journey beyond, but it was thought that at least the Brazilian savannahs could be gained and studied, while chance might favor the successful accomplishment of the whole journey. Accord-



Toiling up a sharp ascent on the rolling Brazilian savannahs

ingly on July 28, farewells were said, the "ballyhoo," the "corials" (canoes), and the woodskins were loaded and off we went up the river; late in the afternoon of July 30, we arrived at Chenapowu. The river traveling was over for the time, and now imagination ran ahead along the distant way through the forests and across the savannahs to Roraima, a distance of one hundred and ten miles that had to be traversed entirely on foot. One day's halt was necessary for the organization of the provision loads and for the engagement of additional bearers; and then on August first, the line of twenty-six natives filed off into the forest.

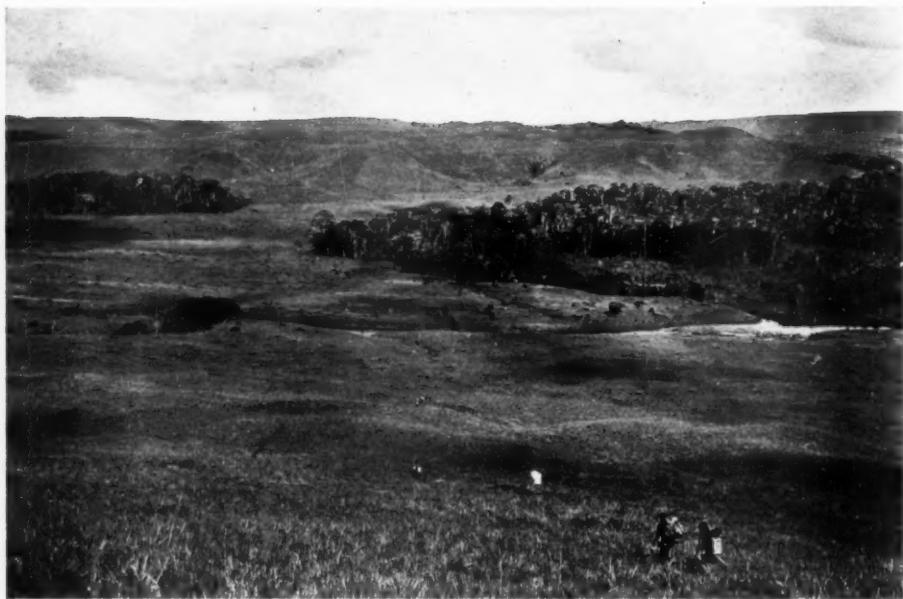
We reached Saveritik on the Ireng River, which forms the Brazilian boundary, at about noon of August 5, with the first third of the long walk successfully accomplished. Taking account of the remaining provisions and of the available time, it was obvious that a crisis had been reached. Slow traveling and vexatious delays had so reduced supplies that they were insufficient for the journey to Roraima and back to Saveritik. Two courses were open: we could go on within the margin of safety, penetrate for some distance into Brazil, and study the life of the savannahs at their northern limit, or we could still make the effort to reach Roraima in the hope and expectation of obtaining food somewhere beyond. The lure of the famous mountain made the decision, and accordingly the number of bearers was reduced to seventeen, while four men were sent back to Kaieteur for additional supplies to be at hand on our return to that point. On August 6 we safely passed the river, and it was not without some emotion that I stepped out into the forests of Brazil, a country that will always hold the interest of scientists on account of the work of such men as Bates, Wallace, Agassiz, and Darwin.

After a steep climb through the forests up to a barometric level of 3600 feet, we emerged on to the great savannahs. Before us rolled great grassy plains marked here and there by the deeper greens of the forest trees along the watercourses. Occasionally an outcrop of reddened soil or gray clay added its contrasting color. From this time on, we lived amid such scenes, camping for the noonday meal in a patch of forest by a wayside stream, or sometimes on the open savannah, unprotected from the fierce direct rays of the sun at its zenith. Gathering specimens by the way we would at length come to a favorable site for the night camp where the bundles of equipment would be set down, the natives would receive their rations, and the smoke from the camp fires would rid us of the sandflies which were always present in immense numbers.

After several days of such traveling we came out upon the great headland overlooking the beautiful valley of the Kwating River whose wide plain spread 1500 feet below, and at last we could see flat-topped and cloud-



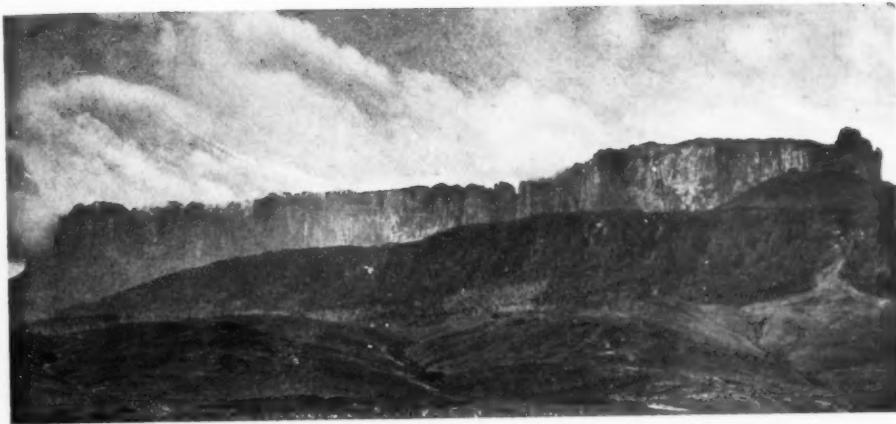
A SUCCESSFUL KILL BY THE GUIANA CARIB INDIANS OF THE EXPEDITION
On the savannahs of Brazil during the return journey when rations were short



The valley of the Arabopo River, an affluent of the Orinoco near its source in the high savannahs near Roraima



The southern end of Mount Roraima 8600 feet high, viewed from a headland 4500 feet high four miles distant
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The southwest face of Roraima, three miles across. The cliffs are two thousand feet high



A volunteer assistant during the noon-day halt at an Indian settlement



Bartering for food and Indian handiwork during a visit to Chief Jeremiah and his Arecuna tribe on the lower slopes of Roraima

veiled Roraima, still several days journey away. At a place called Parmak, formerly the site of a flourishing village of Indians, a guide was found who knew a shorter way to the goal, which led to the southward of the great terraced mountain of Weitipu instead of to the north as in the case of the route known to the geographers of Georgetown. So with renewed courage we disregarded the low condition of supplies and again pushed on toward Roraima.



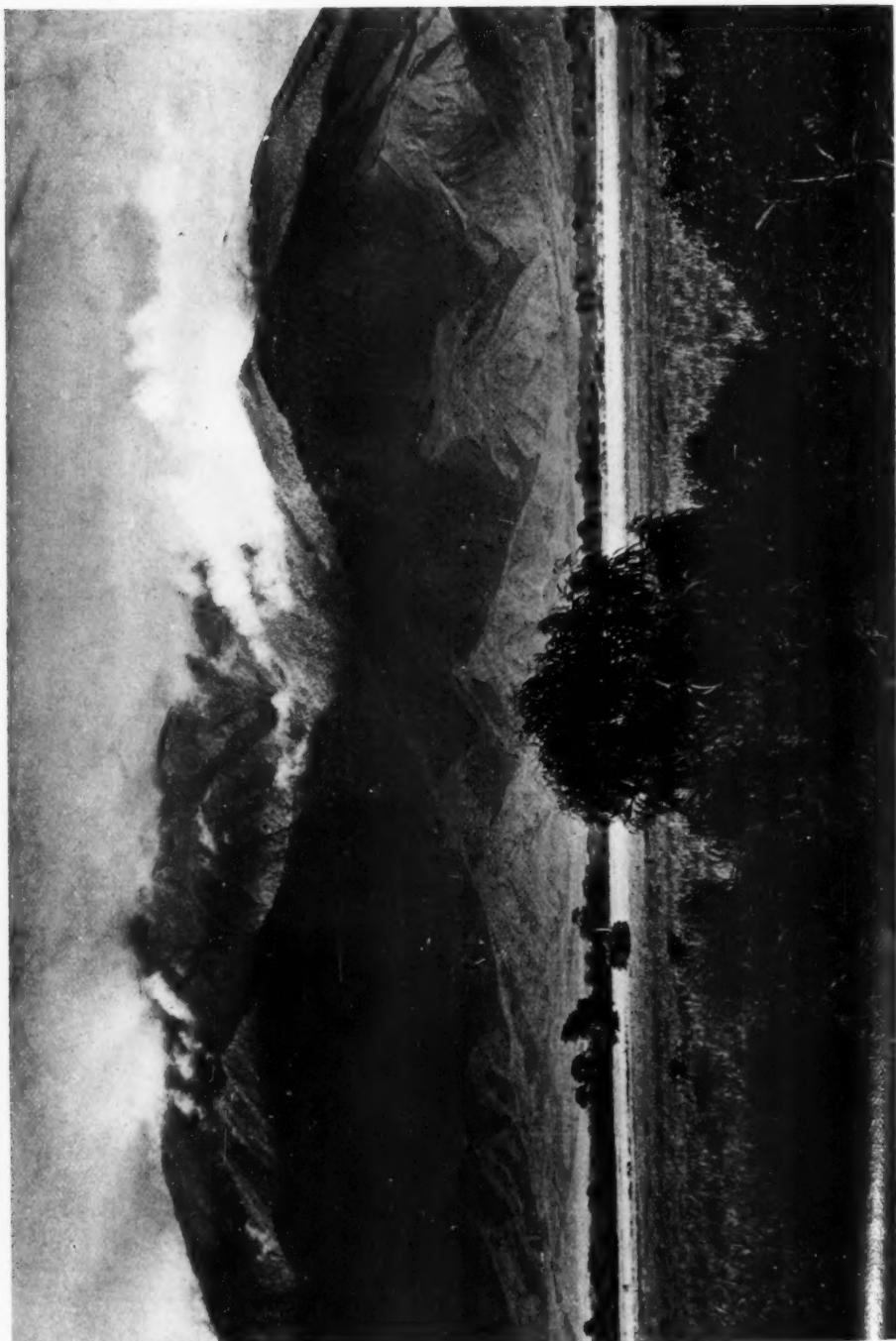
Camp at Saveritik on the Guiana border where Ackawoi Indians continually crowded about to barter

Finally on August 13, we reached the lower slopes of the great mountain, and camped for the night in a small patch of woods about a mile short of an Arecuna Indian village called Kamaiva-wong. From this place the savannahs roll upward to a forest belt, from five thousand to six thousand feet in barometric level, and then the great cliffs rise two thousand feet to the jagged edge of the flattened mountain top. A narrow and shallow gorge intervenes between Roraima and Kukenaam, the latter scarcely less impressive than its more famous sister. Down the cliffs fall the narrow streams of water that reach the Atlantic Ocean by way of the rivers of Guiana, the Amazon, and the Orinoco — so close are the sources of these widely diverging streams.

The next morning, with four or five of my Ackawois, I walked the intervening mile or so to Kamaiva-wong, and was received by Chief Jeremiah and his tribe, with whom I bartered for bows and arrows, baskets and blow-guns, and the cassava bread which was so much more necessary and desired. In the afternoon, studies were made on the upper slopes toward the cliffs, the evening meal was eaten, and we turned in, not without misgivings regarding the return journey which was to begin on the morrow. The ascent could not be attempted for lack of time, while furthermore the top is already well known from the studies of Sir Everard im Thurn and of Quelch and McConnell.

The journey was interesting though arduous. Naturally, fuller results might have been secured had the time been longer, but on the whole the expedition was successful. The Indians were splendidly efficient carriers, while to Charles Raggoo, my capable Hindu, a large share of credit belongs, as his long experience in the bush provided a fund of knowledge upon which I drew largely in conducting the affairs of the expedition.

It is difficult to present the biological results of the expedition in a brief form for the material must be studied in great detail, yet some significant facts appear with clearness. The survey passed from the forests of the coast to those of Roraima itself, and everywhere, no matter what the altitude might be, certain species recurred again and again; other species seemed to be characteristic of savannahs of all levels. Still other organisms were restricted to levels of a given altitude; and finally each river system had its peculiar types. Combining this analysis with similar studies elsewhere, in time we will gain the sought-for knowledge of distribution and evolution.



THE CENTRAL ANDES, WESTERN COLOMBIA, LOOKING EAST FROM THE CAUCA VALLEY

THE ZOOLOGICAL EXPEDITION TO WESTERN COLOMBIA

By *Frank M. Chapman*

NOW that the birds and mammals of North America are adequately represented in our museums, American zoologists are turning their attention to South America. At the present time the fauna of South America is represented in European museums much more fully than it is in American museums. It is high time therefore that we should enter this field, and the beginning of the present year saw no less than six American expeditions engaged in zoological work in northern South America. Among these, two represented the American Museum — namely, one conducted by Mr. M. A. Carriker, Jr., who is collecting mammals for the Museum in Venezuela and the Santa Marta region in Colombia; and a second, under the direction of the writer, in the Cauca region of Colombia. This portion of Colombia is said to be one of the most mountainous regions in the world. Its great physiographic diversity and the widely varying climatic conditions to be found there make it doubtless one of the most interesting parts of South America for biological work.

While many thousands of birds and mammals have been collected in tropical America heretofore, a large proportion of them have been secured either by natives or by professional collectors, who were more interested in the acquisition and sale of specimens than in the record of observations which would make these specimens of value in the study of a distribution of life. In selecting this part of South America therefore as a field for investigation, the Museum had in mind not only the enrichment of its collections, but also the gathering of data on which to base a study of the distribution of life in this exceedingly interesting and comparatively little-known part of the world.

It will be observed that immediately north of the boundary of Ecuador, the Andes are divided into three well-marked ranges, Coast, Central and Eastern. The Coast Range, so far as our explorations have informed us, does not exceed an elevation of 10,500 feet. The average elevation of the Central Range is about 12,000 feet, with several peaks having an elevation of at least 18,000 feet. Snowline we have found to be reached at an elevation of 15,000 feet. The Eastern Range reaches approximately the elevation of the Coast Range and is without snow peaks. Between the Coast and the Central Ranges lies the Cauca Valley, some two hundred miles in length and thirty in width, and having an average elevation of 3500 feet; in this respect being unlike any other valley of similar extent in South America. So far as its climate goes, it is rather an elevated plateau than a valley. Between the Central and the Eastern Ranges lies the valley of the



Standpoint in the heavy forest on the summit of the Coast Range of the Andes chosen for reproduction in a Museum habitat group. The moss-covered tree trunks indicate the extreme humidity of the locality

Magdalena, which at the headwaters of navigation, some thousand miles from the sea, has an altitude of only a few hundred feet.

In addition to the climatic zones lying between sea level and snowline, the faunal conditions of this region are further diversified by rainfall. The western slope of the Coast Range differs widely from the conditions prevailing on most of the Pacific coast of South America, in being exceedingly humid. The annual rainfall at the port of Buenaventura is said to exceed four hundred inches. The western slope of the Coast Range therefore, from sea level to the summit of the range is densely forested. The eastern slope of this range however, lacking the heavy precipitation which occurs on the western slope, is comparatively arid and consequently treeless. The Cauca Valley itself receives, for the tropics, only a limited amount of rain, sufficient however for agricultural purposes; while the foothills of the

western slope of the Central Range apparently do not receive a sufficient amount of rainfall to produce heavy forest growth. When one ascends the Central Range however, heavy forests are found at an elevation of about 6000 feet, and from this point to 12,500 feet forest growth prevails. Above 12,500 feet occur the paramos, those treeless marshes which may be compared to the tundras of the North.

Adding to these widely varying conditions the broad savannahs of the Cauca Valley, it is clear that we have here a region suited to the wants of a great variety of life and one offering an exceedingly promising field for the study of the influences which govern the distribution of life.

In November, 1910, Mr. W. B. Richardson was dispatched to the Cauca Valley, with headquarters at Cali and instructions to work the west slope of the Coast Range. In March, 1911, the writer accompanied by Mr. Louis Agassiz Fuertes as artist, and Mr. Leo E. Miller as préparateur, joined Mr. Richardson at Cali. Mr. Richardson having completed his work on the western slope of the Coast Range, we began our operations on the summit of the range near the San Antonio Pass, at an elevation of 6600 feet. Here large collections were made, as well as field studies for a habitat group, which has for its immediate foreground the forest on the summit of the Coast Range, whence one looks down the arid east slope of this range to the fertile Cauca Valley with the Central Range rising in the distance.

From this point the expedition journeyed to the hacienda La Manuelita in the Cauca Valley, three miles north of Palmira, where for a time we were the guests of Mr. Charles J. Eder. Later we ascended the Central Range to the eastward reaching an elevation of 6200 feet, where Mr. Eder placed at our disposal a bungalow which he has had erected there. At this point primeval forests were only three hundred feet above us, and we found ourselves very favorably situated for the purposes of collecting and observing. Expeditions were made farther into the mountains from this point as a base, and much interesting and novel information secured.

From Miraflores, as this locality is named, we traveled northward into the Cauca Valley in an effort to find a place at which first-growth forests still exist. In this attempt however, we were only partially successful since the region has been so long settled that the original forest has disappeared. Returning to Cali, our base, on May 15, Mr. Richardson with Mr. Miller and a native assistant, were sent to Popayán at the southern end of the valley with instructions to penetrate the Coast Range to the westward, while Mr. Fuertes and the writer went up the valley to Cartago at its northern end, and thence across the Central Andes over the Quindio Pass to the Magdalena River at Girardot; here we embarked for Barranquilla near the mouth of the river, and later sailed from Santa Marta for New

York. This reconnaissance was made to enable us more effectively and more intelligently to direct further work in this region.

On August 15th, Mr. Richardson and Mr. Miller returned to Cali after a most successful trip in the Coast Range. In the meantime Mr. Arthur A. Allen had been sent to Cali to replace Mr. Richardson, whose contract had expired. Mr. Miller and Mr. Allen started for Cartago August 23 en route to the Central Range to work certain localities which had been discovered on our homeward journey. Letters received from them dated September 29, tell of the success which has attended their efforts. Collections have been made at 10,500 feet, and also on the paramo of Santa Isabel at elevations ranging from 12,500 to 15,000 feet, or to the lower limit of snow. Having completed their section of the Central Range to the Magdalena Valley, they will return to Cartago from which point they will make a section in the Coast Range toward Nóvita.

The results thus far accomplished are exceedingly interesting and valuable. Already the Museum has received some three thousand birds and five hundred mammals, an unusually large proportion of which are new to its collections, while others are obviously new to science.



Standpoint of the new bird group. Tree fern at the right



A Sun Dance among the Plains Cree Indians

ANTHROPOLOGICAL FIELD WORK FOR THE YEAR

By Clark Wissler

THE field investigations of the anthropological staff have in the main been directed toward the solution of one general problem, the historical relations of cultures up and down the central portions of the United States and Canada. A few years ago this investigation began with simultaneous visits to the Cree Indians around Hudson Bay, the Crow



A Blackfoot woman praying to the setting sun. At one stage of the annual Sun Dance old women come forward with women and children for whom they call upon the Sun to exercise fatherly care during the year. The Sun Dance was first observed by Dr. E. P. Goddard on a Museum expedition in 1911, and in so far as it has never been reported for his tribe may be said to be a discovery.

and other tribes of the Plains, and the nomadic and more sedentary tribes of the Southwest.

Within this geographical belt there are survivors of many prehistoric groups, speaking some twenty languages and representing several somatic types. This year all our field staff has concentrated on two main points, the systems of social groupings (or societies) and ritualistic forms. The first derives its importance from its choice by some sociological students as an example of a certain inner determined evolution, or a scheme which the assumed unfolding of social life was ordained to follow. Now, our studies have made clear that no such unfolding has taken place in this region, but that we have a rather highly developed system of coöordinated societies in a few central tribes with various remnants among the marginal groups, seemingly best explained by assuming that some one or two of the central group constructed or invented these schemes of organization and that others copied from them to a greater or less degree. Thus it is probable that the results of this phase of this year's work will be of some general theoretical importance aside from the accumulation of new knowledge concerning the tribes in question.

The study of ritualistic forms has also a theoretical interest because we find a strong tendency for each group of Indians to conserve one more or less individual type of ritualistic ceremony. This is only now apparent since we have fairly complete data on all the many rituals still known among a few tribes. It remains to work out a comparative view of these types. Waiving this theoretical problem, we have resulting collections of systematically recorded data which will in a few years be unavailable except in our field notes. Perhaps few realize that in North America the Indian is no longer leading a life different from that of his white neighbors and information as to his former life is to be had only from a few old people who will pass into the beyond within a few years.

During the year the Chipewyan, Cree and Sarsi of Canada were visited; also the Menomini, Crow, Hidatsa, Mandan, Santee, Dakota, and Teton-Dakota of the northern Plains; and the Kiowa Apache and Jicarilla Apache of the Southwest; all in connection with the above coöordinated investigation. In addition, some other special investigations were undertaken. Mr. Max Schrabisch is exploring the out-of-the-way corners of New Jersey for rock shelters used by prehistoric man. This work has proved them to be rather numerous and to have in them traces of different culture levels, a feature so far rare in North America. Mr. W. S. Taylor visited the Tlingit of Alaska for studies in form and color to be used in his series of mural sketches illustrating certain phases of North Pacific culture — pictorial habitat groups they may be called. In the field Mr. Taylor was assisted by Lieutenant G. T. Emmons.

HARLAN I. SMITH: EXPLORER IN ARCHAEOLOGY

MR. Harlan I. Smith, recently severed his connection with the Museum as Associate Curator in Anthropology, to accept the appointment as official archaeologist to the Canadian Government and Curator of the division of archaeology in the Victoria Provincial Museum. He has been connected with the American Museum since his appointment as Assistant in Archaeology in 1895.

During his long and efficient services in this Museum, Mr. Smith was identified especially with the Jesup North Pacific Expedition for whose archaeological work he was mainly responsible. His first important work was in British Columbia in the valley of the Thompson River. Here he made extensive excavations at Spences Bridge, Kamloops and Lytton, discovering numerous remains of previous habitations, some of which were without doubt of considerable antiquity. Almost all his finds at these places antedated the advent of the whites and gave an excellent insight into the culture of the people of that early period.

Later, he extended his investigations to the shores of Puget Sound and made a special exploration of the shell-heaps in the Fraser Delta. This work was followed by an extensive exploration of the Columbia River valley especially in the Yakima district. His investigations as a whole, seem to indicate a prehistoric movement of the interior plateau people of British Columbia out to the Pacific coast. The results of this series of investigations have appeared in the *Memoirs of the Jesup North Pacific Expedition* as follows: "Cairns of British Columbia and Washington"; "Shell-Heaps of the Lower Fraser, British Columbia"; "Archaeology of the Gulf of Georgia and Puget Sound"; "Archaeology of the Thompson River Region"; and the "Archaeology of Lytton, British Columbia"; and also in the *Anthropological Papers*: "The Archaeology of the Yakima Valley."

While preparing for the press the above publications he became greatly interested in what he has designated as "an unknown field in American archaeology." To use his own words: "Nothing is understood of the life of the prehistoric people, the direction from which they came, or when they arrived, in a portion of the United States and Canada larger than all the rest of those countries. This area stretches from the Gulf of Mexico to the Arctic Ocean and occupies most of the country between the Mississippi Valley and the Coast Range. It includes the Mackenzie basin, the Barren Lands and the Great Plains. In the United States, eastern Washington, Oregon, and California, all of Idaho, Montana, Wyoming, and Nevada, northern Utah and Colorado, all of Texas but the eastern edge, most of Oklahoma, Kansas, and Nebraska and the western part of the Dakotas belong to this region which we may popularly term 'darkest archaeological

America.' " He was profoundly impressed with the almost absolute lack of archaeological knowledge concerning this territory, in contrast with the very great contemporary general interest of ethnologists and the acknowledged importance of archaeological data to supplement the results of their investigations. He was further stimulated to take up work in this region because of the somewhat primitive character of the few archaeological remains so far reported.

In 1907 he began explorations in this field, starting in at the southern boundary of Wyoming. The northern and eastern parts of the state were visited the following year where he made important discoveries of prehistoric quarry sites as well as other important traces of prehistoric races. A preliminary report of these investigations was published in the *Bulletin of the American Geographical Society*, July, 1910.

For the Museum to do without Mr. Smith's services is a distinct loss but since he was the first to develop the archaeology of western Canada and perhaps the first to do serious systematic work in that field, he was the logical man to take up the problem when the Canadian Government felt ready to give the subject especial inquiry.

COLLECTING FOSSIL FISHES IN OHIO

By Bashford Dean

DURING the summer of 1911 the Department of Fishes and Reptiles arranged for its Associate Curator, Dr. Louis Hussakof, to visit the localities in Ohio which had yielded rich finds in fossil fishes—an expedition made possible through the Cleveland H. Dodge Fund. It was from these localities that many forms of Devonian fishes had been obtained, which were described in early papers of Professor J. S. Newberry, and which have ever formed a lengthy and important chapter in the ancient history of fishes.

The forms from Ohio included mainly huge creatures whose head and shoulders were closely covered with plates of bone and whose dentition showed that they were easily the dominant animals of their early age. Unfortunately in spite of numerous earlier collections, few details could be discovered to show clearly what kind of animals these "placoderms" really were, or to make clear their lines of evolution, and it was hoped that a renewed exploration of the classic localities would yield material which in later years had become weathered out of the banks of shale and that from these specimens one could obtain additional light on the problem of these fishes. Dr. Hussakof accordingly made a tour of the state, visiting Cleveland, Lorain, Delaware and Sandusky, with a short excursion into Kentucky.

where a somewhat similar formation occurs. He obtained information in regard to local collectors, and was able himself to gather a large number of specimens.

The collecting in the Ohio fields is by no means an easy task. One of the best-known localities has been overgrown by the city of Cleveland. The fossils occur in the core of slaty concretions which appear sparingly scattered in the soft black Devonian shales of that locality. These crumble almost like sand and are weathered away during the changes of spring and fall, exposing here and there great flat concretions usually of circular outline. Where the shales are deeply cut down by the waterways concretions may be found jutting out of the banks, but in such positions they cannot readily be obtained until by continual weathering they have dropped into the bed of the stream. On the other hand, where the shales lie over large surfaces the concretions can readily be examined. Only rarely however do they contain well-preserved fossils. About fifty concretions containing fossils were brought to the laboratory of the department and will be worked out during the present winter. It is hoped that they will furnish important data for the understanding of these enigmatic fishes.



Ohio is a classic field for the discovery of Devonian fossil fishes. One of the best-known localities has been overgrown by the city of Cleveland. The fossil fishes of Ohio were mainly huge creatures whose head and shoulders were covered with plates of bone



The fossils occur in the core of slaty concretions, usually flat and circular, formed by the weathering away of the soft shales

NEWLY DISCOVERED CAVERN IN THE COPPER QUEEN MINE

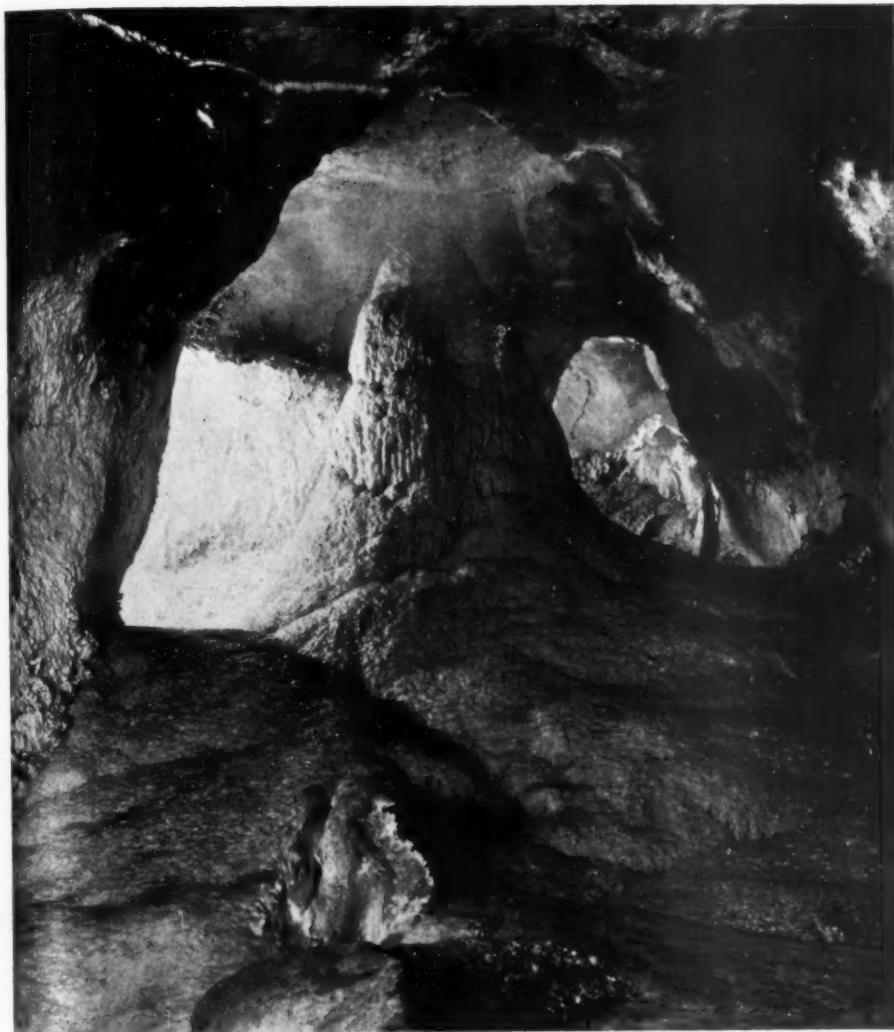
By Edmund Otis Hovey

THE great Copper Queen mine at Bisbee, Arizona, is most famous for the millions of tons of high-grade copper ore which have been taken from it, but it is likewise well known for the beautiful, though small caves that have been encountered in it from time to time in the course of the regular mining operations. These caves have for the most part been found in the limestone of Queen Hill, the eminence that forms the southwest wall of Tombstone Cañon at Bisbee. One of the caverns broken into during the active life of the old Queen Incline, almost in the heart of the city, twenty or twenty-five years ago furnished the wonderful green and white curved and ordinary stalactites and the stalagmites that adorn the Gem and Mineral Halls of the Museum.

There is therefore small cause for wonder that I was much interested in the report of the finding of this new cave. The word reached my ears immediately on my arrival at Bisbee, where I had gone with three men to collect the data needed in the construction of the great Copper Queen model which is being made for the Museum through the generosity of a friend of the institution. The cave had been discovered some months before, but immediate steps having been taken to control access to it, its rooms and their formations were still in their pristine perfection and beauty.

Having donned regulation mine costumes early one morning, we started for the underground cavern. After descending the Czar shaft two hundred feet to the "second level" we walked southwestward toward a point almost directly beneath the summit of Queen Hill. A quarter of a mile or more — it seemed at least a mile — from the big shaft we came to the foot of a "raise," up which we were drawn four hundred feet by an electric hoist. The journey from the shaft along the level through solid limestone had been cool and comfortable, but as we went up the raise both the moisture and temperature of the air increased, because we had entered the "leached ground" where the oxidation of the original ores produced heat, just as does burning coal. A few yards from the raise we reached the top of a "manhole" cut through the heating ore. Now it was necessary to climb forty feet down vertical ladders to the heavy plank door that guarded the cave.

Squeezing through a small hole beyond the doorway, we found ourselves at the bottom of the cave in a small room whose ceiling scarcely permitted one to stand erect. The bright light of our acetylene mine lamps showed that the room was lined with alabaster, tinted a delicate green with carbonate of copper. Walls and ceiling were comparatively smooth but incrusted



The large room (thirty feet high and forty feet across) of the cave was one of the most beautiful sights imaginable in the brilliant illumination of our acetylene mine lamps. Its chief feature was the great greenish white stalagmite (fourteen feet high) rising at its upper end, so impressive in size and setting, so beautiful in outline, ornamentation and surroundings that it seemed little short of vandalism to destroy or mar it, or any part of the cave which it adorned, although in the interests of science

with minute crystalline surfaces that glittered in the rays from our lamps, while the floor was uneven with knobby clusters of calcite, and held here and there a shallow pool of limpid water. The upper exit from this first chamber was almost closed with great blocks of rock that fell from the ceiling so long ago as to have received their own coating of dripstone. Worming our

way upward among these for a few yards, we emerged into a clear chamber fully thirty feet high and forty feet across. The floor rose at a steep angle and its coating became part of the base of a great stalagmite.

This large room was one of the most beautiful sights imaginable in the brilliant illumination of burning magnesium ribbon. Its floor was a thick mass of dripstone, its walls were partly smooth white calcite and partly, toward the top, the deep velvety brown, red and black of the iron- and manganese-stained residue of the decomposed country limestone, while the ceiling was mainly of the limestone but banded with sheets and small stalactites of calcite. These occurred along the old cracks in the mountain mass, which formed the channels for percolating waters, an important factor in the formation and incrustation of the cave. The lower part of the walls was thickly covered with botryoidal clusters of white calcite, some areas of which were tinted a delicate salmon color with carbonate of manganese.

The chief feature of the room was the great greenish white stalagmite rising at its upper end and reaching almost to the ceiling. So impressive in size and setting, so beautiful in outline, ornamentation and surroundings was this wonderful object that it seemed to us little short of vandalism to destroy or mar it, or any part of the cave which it adorned, although in the interests of science or the necessities of mine operation. This stalagmite is about fourteen feet high above the shelf of limestone on which it stands and its diameter at the same point may be taken as being fourteen or fifteen feet. Three feet above the shelf the column is ten feet through. Stalagmite is of extremely slow growth and even under the more favorable conditions prevailing at Luray Cave, Virginia, where measurements have been made, such a mass would have required more than 67,000 years to form; hence it is safe to assume that this cavity in the Queen Hill has had its present size and shape for a much longer period than that, since the rainfall is less and the consequent solution slower in Arizona than in Virginia, though evaporation and consequent deposition are conversely more rapid in Arizona. The stalactite growth above this stalagmite was insignificant.

Climbing up the congealed waterfall forming a smooth apron in front of and below the stalagmite, we passed to the left of the column over a floor carpeted with coarse botryoidal clusters of calcite and clambered through an opening in the black rock into a room that might be considered the fourth story of the cave. Immediately at our right was a compound stalactite which our miner associates promptly called the "elephant's ear," while a few feet beyond was a remarkable stalagmite three feet in diameter and rather more than three feet high, which with its smaller stalactite and its accompanying crystal-covered floor and wall formed a charming grotto.

This stalagmite was noteworthy on account of the radiating clusters of pointed calcite thickly set all over it but diminishing in size from the bottom of the column upward. It has been commonly held that such crystals could be formed only under water, but conditions here indicate that there has been no submergence or filling of the cave since it was formed and we must conclude that in a region of extremely rapid evaporation crystals will grow from a solution flowing over a surface.

The upper wall of this room was formed by a great block of fallen rock which has received the drippings of a lime-bearing watercourse. Stalagmite was formed on its top, while ribs of calcite, some of which were complete lines of crystal tufts, projected close together from its sides. Narrow, drip-stone-lined passages on either side of this block led to a series of three small rooms one above another, the last of which was so low that an adult could hardly squeeze his way into it. These upper rooms were characterized by abundant stalactites and practically no stalagmites, contrasting with the conditions in the lower rooms where the stalagmites predominate at the expense of the stalactites. One of the most beautiful small features of the cave was the occurrence on the walls of one of the upper rooms of long acicular crystals of delicate green calcite grouped paintbrush fashion on small botryoidal masses of the same material. The cave extended up slopes averaging thirty degrees, through a vertical distance of about eighty feet and nowhere exceeded forty feet in width and thirty feet in height.

Inasmuch as the cave was doomed to ruin through mining, the company generously furnished the men and the means for removing at infinite pains the grotto and such other formations as we desired, and for transporting them to New York. This material is now at the Museum and there will soon be in place and on exhibition a reproduction of this most beautiful underground chamber.

MUSEUM NEWS NOTES

THE following have been elected recently to membership in the Museum:
Fellow, MR. JOHN A. GROSSBECK;

Life Members, DR. ARNOLD KNAPP, MESSRS. ANTHONY N. BRADY, FREDERICK F. BREWSTER, HAROLD J. COOK, FRANCIS R. HITCHCOCK, HENRY LANG, JOSEPH J. NUNAN, JOHN J. PIERREPONT, CHARLES DE RHAM, EDWARD W. SHELDON, HENRY ATTERBURY SMITH, MMES. GEORGE C. CLAUSEN, CHARLES W. HARKNESS, JAMES J. HIGGINSON, DANIEL S. LAMONT, JAMES ROOSEVELT, JACOB H. SCHIFF, CHARLES STEWART SMITH, H. P. WHITNEY, MISSES HELEN HURD, ROSAMOND PINCHOT, and MASTERS VARICK FRISSELL and GIFFORD PINCHOT, 2d;

Sustaining Members, MR. NELSON W. GREENHUT and MRS. GEORGE W. PERKINS;

Annual Members, RT. REV. WILLIAM CROSWELL DOANE and WILLIAM LAWRENCE, REV. W. T. CROCKER, COLS. OSMUN LATROBE and ROBERT B. WOODWARD, DR. JOHN ASPELL and ERNEST V. HUBBARD, MESSRS. PAUL BAERWALD, M. W. BENJAMIN, HENRY J. BERNHEIM, B. G. BRAINE, EDMUND M. BRENNAN, FRED T. BUSK, JAMES G. CANNON, BENNO COHEN, MAX COHEN, HERMANN CONHEIM, W. R. CROSS, LORENZO DANIELS, J. R. DELAMAR, O. L. DOMMERICH, MORRIS DWORETZKY, JAMES M. EDER, NEWMAN ERB, HENRY ESBERG, S. A. FATMAN, WALTON FERGUSON, LOUIS L. FIRUSKI, PLINY FISK, ISAAC D. FLETCHER, THOMAS POWELL FOWLER, MORTIMER J. FOX, ALEXANDER VON GONTARD, PERCY T. GRIFFITH, M. GRUNDNER, MORITZ HILDER, CHARLES W. HOFFMAN, CLARENCE J. HOUSMAN, EDWIN S. KASSING, OTTO KAUFMANN, FRED T. KELLERS, JAMES GORE KING, HERBERT R. LIMBURG, THOMAS J. McBRIDE, ROBERT H. McCURDY, E. A. MCGUIRE, EDWIN G. MERRILL, JULIAN H. MEYER, E. D. MORGAN, ELAM WARD OLNEY, PHILLIPS PHOENIX, J. HARSEN PURDY, WILLIAM B. ROGERS, S. S. ROSENSTAMM, THOMAS SMIDT, PIERRE J. SMITH, HOWARD TOWNSEND, FRANK A. VANDERLIP, J. TROWBRIDGE VREDENBURGH, A. WIEDENBACH, WILLIAM G. WILLCOX, MMES. CHARLES B. ALEXANDER, GEORGE BLAGDEN, JOSHUA S. BRUSH, C. H. COSTER, CHARLES D. DICKEY, H. WINTHROP GRAY, HENRY W. HARDON, J. B. FRANCIS HERRESHOFF, CHRISTIAN A. HERTER, JOHN S. KENNEDY, E. H. LANDON, AGNES LATHERS, AMORY LELAND, PAYSON MERRILL, FREDERICK PEARSON, STEPHEN PELL, HENRY PHIPPS, N. T. PULSIFER, CHARLES CARY RUMSEY, JAMES SPEYER, BENJAMIN STRONG, HENRY W. TAFT, MRS. ADDISON MITCHELL and ELVINE RICHARD.

CAPTAIN W. H. COTTINGHAM, MR. HAROLD J. COOK and MR. JOSEPH J. NUNAN have recently been elected Life Members in recognition of services rendered to the Museum's field parties in Alberta, Nebraska and British Guiana respectively.

MR. STEFÁNSSON of the Museum's Arctic Expedition reports a very interesting discovery of an archeological nature at his last winter camp near Pt. Stivens, Parry Peninsula. According to his report a great deal of pottery is found upon old village sites, some at a depth of several feet. This pottery is of similar type to that found among and lately manufactured by some of the Alaskan Eskimos. Pottery has so far not been reported from any of the Central and Eastern Eskimos. It was formerly assumed that the presence of pottery among the Alaskan Eskimos was to be explained as indicating forms copied from Siberian or neighboring American tribes. The

recent discoveries of Mr. Stefánsson have made it certain that this cannot be the true explanation and that the art of pottery among the Eskimos must have been of ancient origin and at one time very widely distributed. Furthermore Mr. Stefánsson reports that other objects he finds are similar in type to those described by Professor Boas, discovered by Captain George Comer in ancient village sites in Southampton Island, Hudson Bay. These were also similar to objects recently discovered in Greenland, leading to the conclusion that older types of Eskimo culture must have been much more uniform throughout the entire stretch of Arctic America than at present. Mr. Stefánsson's find of similar objects on the west side of Hudson Bay makes it more probable that there was formerly but a single type of Eskimo culture from Alaska to Greenland.

THE Museum has received from Mr. J. A. Grossbeck a gift of some twelve thousand specimens of *Geometridae*. In recognition of this interest in the Museum Mr. Grossbeck was elected a Fellow by the Executive Committee at a recent meeting.

IN 1910 Mr. Roy C. Andrews spent seven months in Japan, studying and collecting specimens at the whaling stations. Not only did he secure a large amount of valuable data as to the anatomy and life histories of various species of cetaceans, but also sent to the Museum the skeletons of six whales and ten porpoises. There still remain however two species of large whales, the California gray and the humpback, of which specimens could not be secured.

The California gray whale (*Rachianectes glaucus*), in Japan called the "devil fish" or "Koku kujira", is to the systematist one of the most interesting of all cetaceans, combining as it does, characters common to both the families of baleen whales. Moreover, it has never been carefully studied and there is little reliable data extant relating to its habits and external anatomy. No museum in America possesses a complete skeleton of this species, and the only places where the animals are being taken in numbers is at the stations of the Toyo Hogei Kabushiki Kaisha in southern Korea. To study and collect specimens of this whale is the object of an expedition which left the Museum for Korea on November 28. After spending some two months at the whaling stations, Mr. Andrews will go into the northern mountains. The region is said to be one of dense forests seldom cut by trails, and exceedingly difficult to penetrate. Both mammals and birds will be collected.

ON November twenty-first, Dr. F. E. Lutz and Mr. C. W. Leng returned from a three weeks' expedition into southern Florida to collect material

for the Department of Invertebrate Zoölogy. This region is particularly interesting on account of its close similarity to northern South America and because it is essentially different in ecological respects from northern Florida.

LAST summer the attention of Dr. E. O. Hovey was called to the existence in the town of Russell, St. Lawrence Co., New York, of a perfect glacial pot hole two feet in diameter and four feet in depth. Pot holes are pot-shaped cavities carved in the rock of a stream bed by the swirling of water carrying stones, a "glacial" pot hole being one formed beneath a glacier. They are common enough in nature, but it is rather seldom that good ones can be collected and brought to a museum.

The present specimen was in a ledge beside a road where the rock containing it could be quarried. The rock is crystalline limestone of Archæan age, containing much flint. Arrangements for cutting out the block were made with the Gouverneur Marble Company and the company sent a channeler and a gaddr from Gouverneur to the pot hole, a distance of about twenty miles, together with a crew of their best men to do the work. It was found necessary to cut out a block six feet square and six feet high. After three weeks of hard work this was accomplished and now the block, crated and ready for transportation and weighing about ten tons, stands beside the road, waiting for winter to come and render the use of a sled practicable for transferring the specimen to the railway station, five miles away.

THE Panama Canal project is illustrated at the north end of the Hall of Geology by means of a relief map of the Isthmus, a collection of specimens of earth and rock from the most interesting places along the canal, and a series of photographs to show the process of excavation and construction.

MR. ERNEST VOLK of Trenton, N. J., has just rearranged the Museum's exhibit of evidences of the antiquity of man in New Jersey. For twenty-five years Mr. Volk under the direction of Professor F. W. Putnam has carefully searched the glacial gravels and the upper strata for signs of man, and deposited the earlier collections in this Museum. The exhibit shows human bones from the glacial gravels that probably represent the oldest known human being in America and also skeletons and stone implements from undisturbed portions of the layer of yellow soil above the gravels. While it is not claimed that the remains are as old as any so far found in Europe, it cannot be denied that they are as old as the strata in which they occur. The exhibit is installed in the South American Archaeological Hall, second floor west.

DURING the past summer Mr. Walter Granger continued the systematic exploration of the Eocene mammal beds commenced in 1903 with the exploration of the Bridger Basin, and continued in the Washakie, Wind River and Big Horn Basins. He secured this year another valuable collection of Lower Eocene fossils including many rare specimens. Through its expeditions the Department of Vertebrate Paleontology is acquiring the materials for a complete history of the Eocene mammals of North America. In some respects it is a more complete record than had been anticipated, for the more careful and thorough stratigraphic work has shown that the formations of the different basins, instead of being successive in point of time, with gaps between them unrepresented by any fossil-bearing formation, are in point of fact overlapping to an unexpected degree, so that by combining the records of the different basins we obtain a nearly complete record of Eocene life history in that region. On the other hand the accurate records now kept of the exact level of each specimen have proved that the evolution series is less continuous and gradual than had been anticipated. New stages in most races appear suddenly and displace the old ones, either immediately or little by little, instead of gradually evolving out of them. This fact may be explained in one of two ways. Either the new stage has been gradually evolved in some other region and reached here by migration; or it evolved not gradually but by sudden changes or "sports"—the method of evolution advocated in recent years by De Vries and others. The careful study of Mr. Granger's collections will supply very important evidence on this problem.

LECTURE ANNOUNCEMENTS

MEMBERS' COURSE

The first course of lectures for the season 1911-1912 to Members of the Museum and to persons holding complimentary tickets presented to them by Members will be given in November and December. These lectures deal chiefly with the Museum's explorations of 1910-1911 and will be fully illustrated by stereopticon. Two only of these lectures remain to be given.

Thursday evenings at 8:15 o'clock. Doors open at 7:45.

December 7—MR. FRANK M. CHAPMAN, "A Natural History Reconnaissance in Colombia."

Mr. Chapman entered Colombia at Buenaventura on the Pacific Coast, crossed the western range of the Andes into the Cauca Valley, then went down the Cauca River to the northern end of the valley and crossed the Central Andes to the Magdalena River, which he followed to the Caribbean. This journey of 1500 miles, through a country of great beauty, was made to secure material for a Habitat Group of Birds in the Tropical American Series and as a reconnaissance in the Museum's proposed biological survey of the Cauca Region of Colombia.

December 14 — DR. CHARLES H. TOWNSEND, "The Voyage of the Fisheries Steamship Albatross to the Gulf of California."

A popular account of an expedition in which the American Museum of Natural History, the New York Zoological Society, the New York Botanical Gardens and the National Museum at Washington coöperated with the U. S. Bureau of Fisheries. The scientific results of the voyage in oceanography, in the fisheries, and the general biology and botany of the coastal regions of Lower California will be presented. Deep-sea dredging was carried on successfully to a depth of two miles. Large collections of mammals, birds, reptiles and plants were secured.

PUPILS' COURSE

These lectures are open to the pupils of the public schools when accompanied by their teachers, and to children of Members of the Museum on presentation of Membership tickets.

Dec. 6 — MR. A. E. BUTLER, "The Rocky Mountain Region."

Dec. 8 — MR. J. A. GROSSBECK, "Insects Useful and Harmful to Man."

PEOPLE'S COURSE

Given in coöperation with the City Department of Education

Tuesday evenings at 8:15 o'clock. Doors open at 7:30.

The last two of a course of lectures on "Great Classical and Romantic Composers" by MR. DANIEL GREGORY MASON. Illustrated at the piano.

December 5 — "Felix Mendelssohn-Bartholdy."

December 12 — "Frederic Chopin."

Saturday evenings at 8:15 o'clock. Doors open at 7:30.

The last three of a course of lectures, "From the Rhone Glacier to the Pillars of Hercules; Courtly Provence and Romantic Spain," by PROFESSOR CHARLES U. CLARK of Yale University. Illustrated by stereopticon views.

December 2 — "Madrid."

December 9 — "Cordova and Grenada."

December 16 — "With Roman and Moor in Andalusia."

LEGAL HOLIDAY COURSE

Fully illustrated. Open free to the public. Tickets not required.
Lectures begin at 3:15 o'clock. Doors open at 2:45.

December 25 — DR. LOUIS HUSSAKOF, "Behind the Scenes in a Natural History Museum."

January 1 — MR. ALBERT E. BUTLER, "Travels in the Rocky Mountain Region."

February 22 — PROFESSOR HENRY E. CRAMPTON, "In the Wilds of British Guiana and Brazil."

